

Implementing the Army Net-Centric Data Strategy in a Service-Oriented Environment

Michelle Dirner
Army Net-Centric Data Strategy (ANCDS) Center of Excellence (CoE)
Data Service Team Lead
RDECOM CERDEC SED in support of SEC
Fort Monmouth, NJ
michelle.dirner@us.army.mil

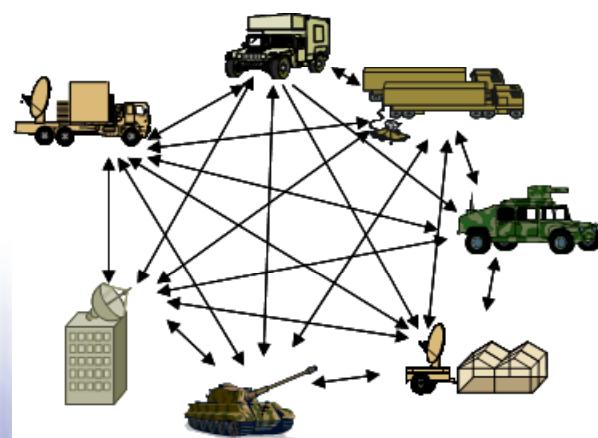
Agenda

- Department of Defense (DoD) Data Strategy Vision
- Army Data Strategy
- Army Data Strategy Center of Excellence
- Data and Service-Oriented Architecture (SOA) Together
- Army Data Service Layer (ADSL)
- ADSL Service Interface Specifications Overview
- Summary

DoD Data Strategy Vision

Current

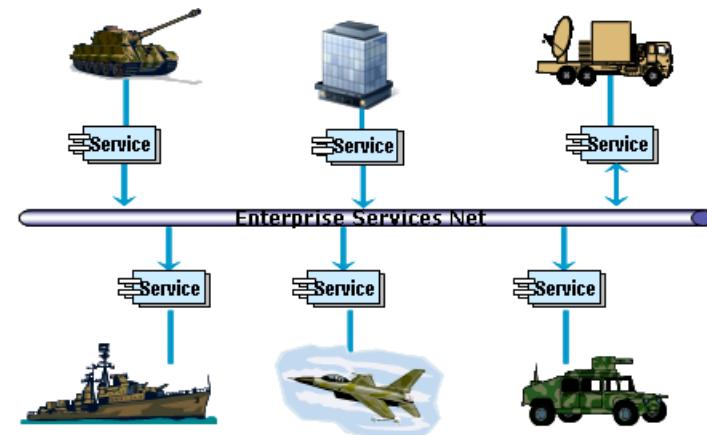
- Pre-determined “point to point” connections between systems and applications on disparate networks
- Producer “pushes” information to pre-defined consumers



Information not easily shared

Future

- Authorized known and unanticipated consumers access data they need regardless of who produced the information
- Systems and applications are web-enabled to expose their information

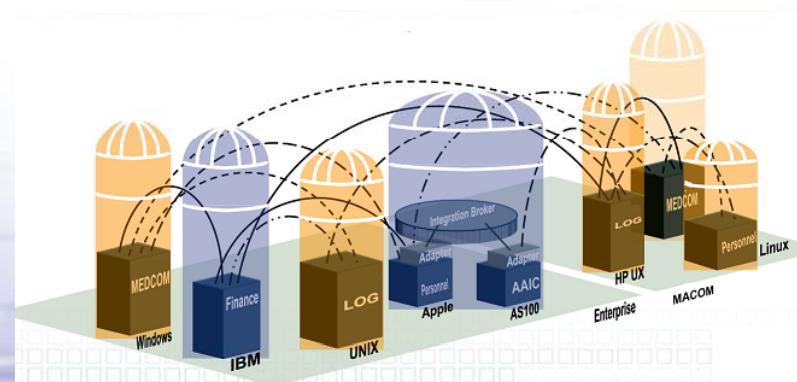


Information Ubiquitous on the Net

Army Data Strategy

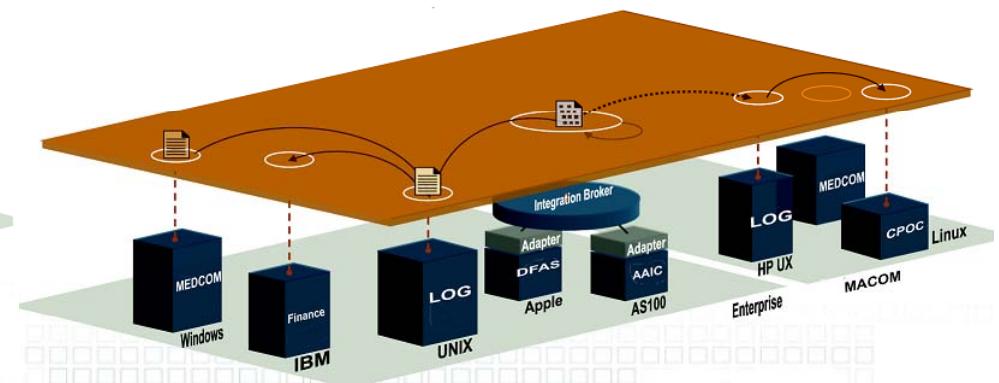
Current

- Few authoritative sources identified
- Complexity of inter-organizational collaboration
- Need for data conversion impacts timeliness of military decision-making process
- Cultural and technical impediments to data sharing



Future

- Federated Enterprise
- Platform independent data and application reuse
- Easily defined and updated business processes
- Standardized interface specifications and authoritative data sources



Army Net-Centric Data Strategy

Center of Excellence Mission

Function as the center of development, adoption and implementation efforts of the Army's Net-Centric Data evolution. ANCDS expertise will be available to all Army Mission Areas, Domains and Communities of Interest (COIs) in support of all Data Strategy activities and interactions with Joint and combined DoD Net-Centric forums.

Responsible for the migration of Current Force System messaging standards to align and interoperate with Net-Centric Data Strategy standards and facilitate the development/implementation of bridging mechanisms necessary to connect Current and Future Force Systems during the migration period.

Ensures that the Army's Net-Centric Data Strategy supports the Service-Oriented Architecture approach.

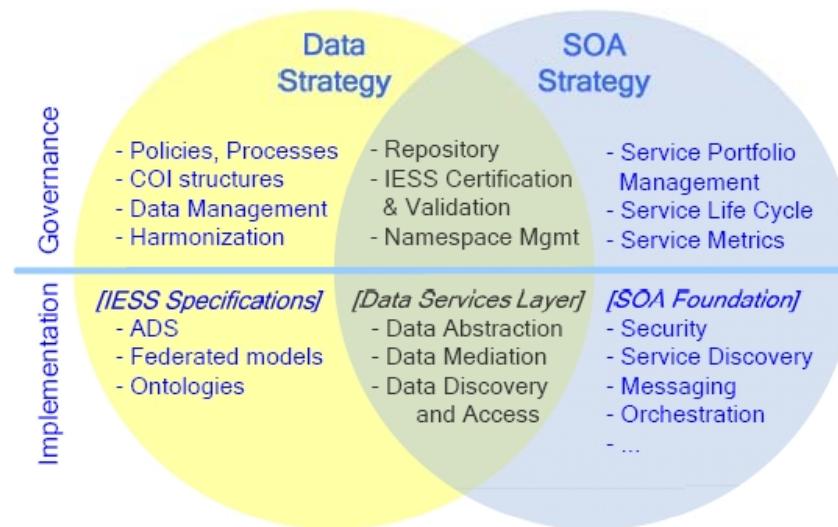


Army Net-Centric Data Strategy Center of Excellence

Data Services Team

- Mission
 - To enable the Army Net-Centric Data Strategy through the implementation of data services, data products, and pilots.
- Objectives
 - Develop and maintain an Army Data Services Framework
 - Develop enterprise data service capabilities
 - Provide guidance and demonstrations for exposing data that can be consumed and understood
 - Provide governance in the development and maintenance of data service capabilities among data providers and consumers
 - Provide Data Support to the Army Enterprise Service-Oriented Architecture.
- Major Initiatives
 - Army Data Services Architecture
 - Army Data Services Layer Service Interface Specifications
 - Data Management Strategies for the Army Data Framework
 - Semantic Data Mediation
 - Schema Repository
 - Virtual Data Integration - Data Abstraction
 - Command & Control (C2) Data Services Pilot

Data and SOA Strategy



Two Complementary Strategies to Achieve Net Centricity

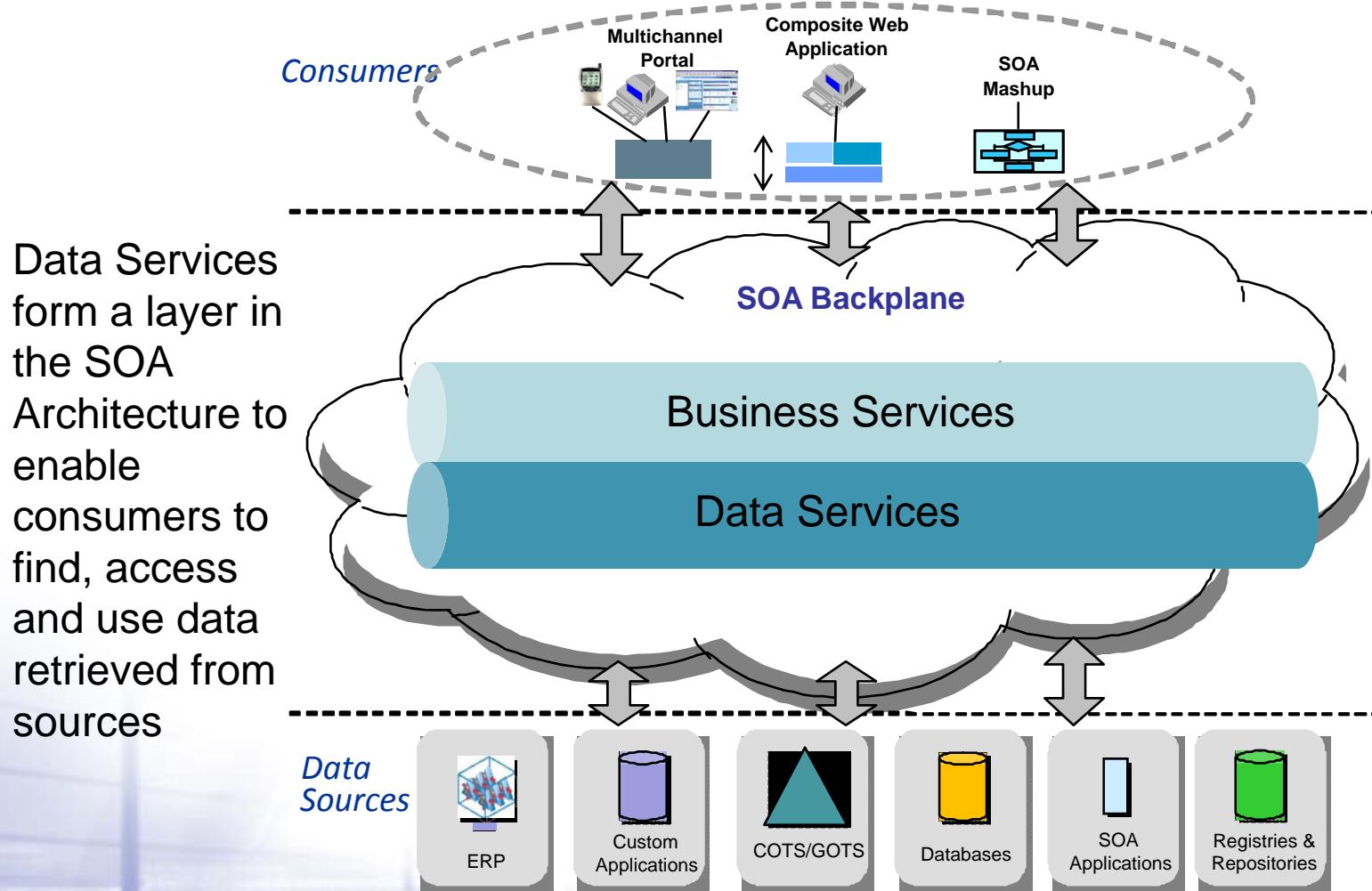
Data Strategy: Prescribes the approach for identifying the data to be shared, where that data can be found (authoritative data sources) and standard representations for sharing that data.

SOA Strategy: Prescribes the approach for identifying and specifying broadly useful services, designing the services environment, and providing a common framework and mechanism for sharing data across heterogeneous environments.

What Are Data Services?

- A Data Service is a type of web service, optimized for the real-time data integration demands of SOA.
- Data Services enable distributed discovery, access, and consumption of data across platforms and organizations, regardless of where the data resides, data type, and/or technical implementation.
- Data Services:
 - Decouple physical and logical locations and avoid unnecessary data replication.
 - Abstract physical data structures and syntax into a common view.
 - Federate disparate data into useful composites.
 - Support data integration across both SOA and non-SOA applications.

Data Services in SOA Architecture

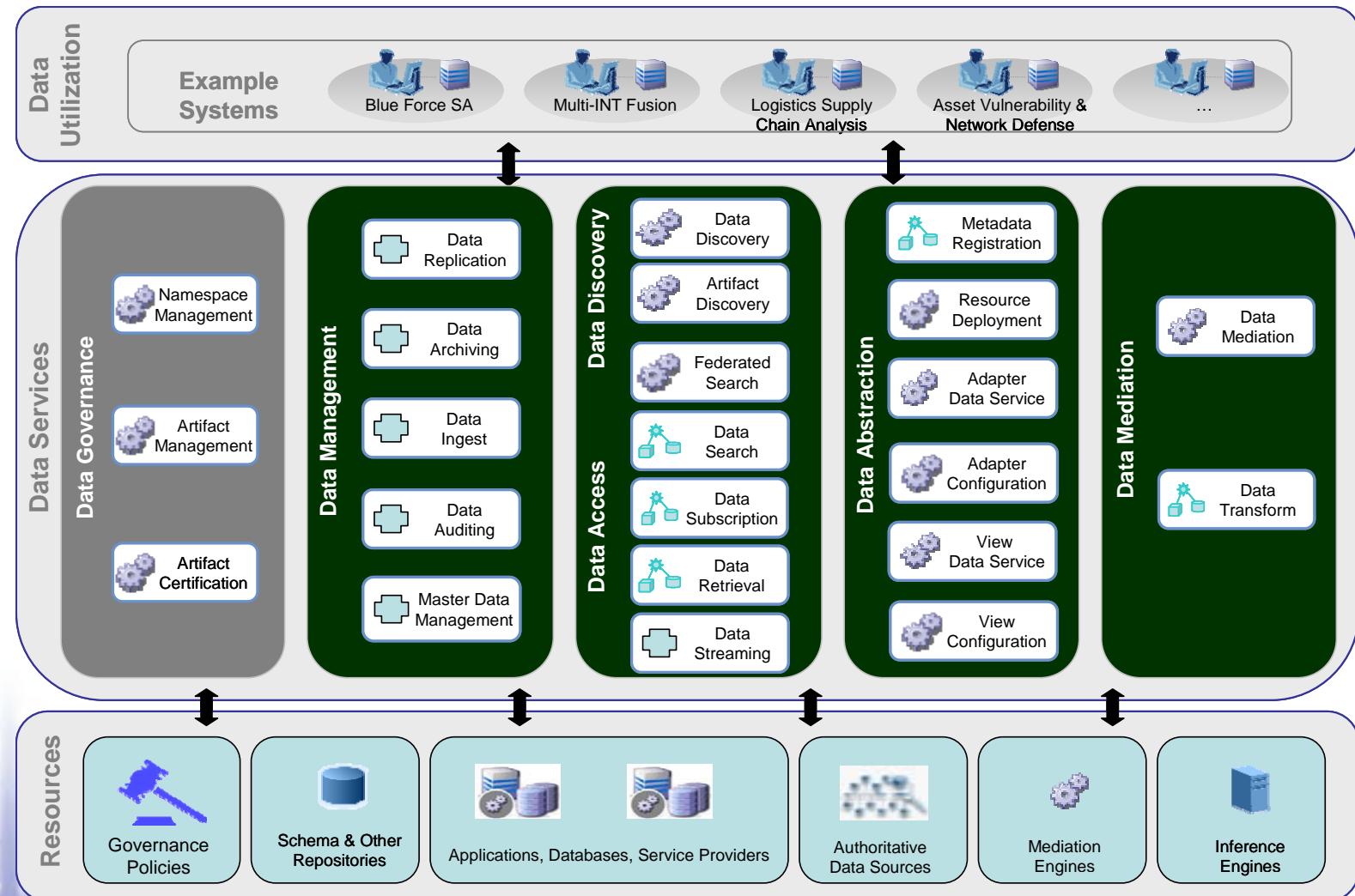


The Army Data Services Layer (ADSL)

- ADSL is a conceptual layer within a SOA construct for enabling data access and exposure.
- To realize this layer, a set of data service capabilities needs to be developed and deployed by data providers and consumers within an Army SOA infrastructure.
 - The ANCDS CoE is developing the framework, tools, and governance to guide in the development and maintenance of these capabilities among data providers and consumers.
- The ADSL construct includes a set of pattern-based service interface specifications that:
 - Provides standardized interfaces, similar to APIs, for common data service operations (e.g., search and retrieve)
 - Guides programs of record in the Army enterprise in the creation of reusable standards-based data services

Army Data Services Layer

Reference Architecture



A capability specified by an ADSL Service Interface Specification



A capability specified by an ADSL Pattern Interface Specification



A capability to be specified in subsequent releases

ADSL Service Interface Specifications

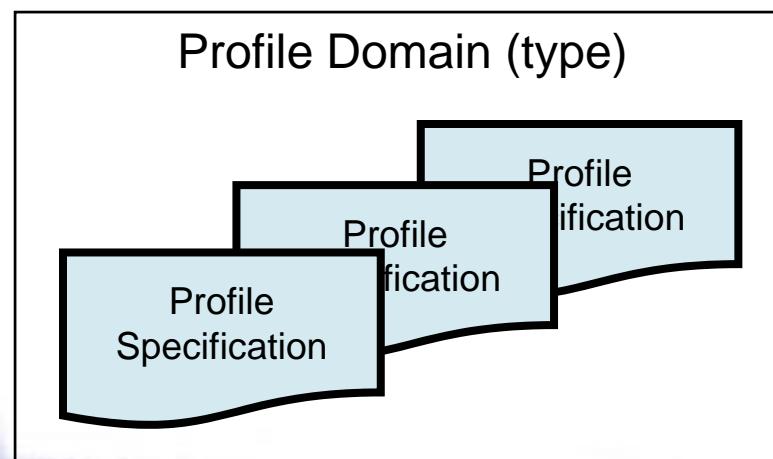
- A Service Interface Specification is essentially a collection of operations that may be called by a consumer. Each operation consists of a Request and a Response.
 - Most Service operations are “inherited” from Pattern specifications used by the service.
 - The operations for a service implementation interface are explicitly defined in WSDLs.
- ADSL builds upon and extends the IC DoD Data Services Reference Architecture (DSRA).
- ADSL is an outgrowth of DoD Net-Centric Enterprise Services (NCES) initiatives.
- ADSL Specifications available on soa.army.mil
- ADSL Architecture available on data.army.mil

Service Specification Structure: Patterns

- A Pattern Interface Specification specifies a fine-grained component functionality that is intended to be reused (or instantiated) in one or more Services.
- A Service Interface Specification may be comprised of operations from any number of Patterns.
- A Pattern may be viewed as a “mini-Service” or a “partial Service” in that could be implemented as a small, standalone service.

Service Specification Structure: Profiles

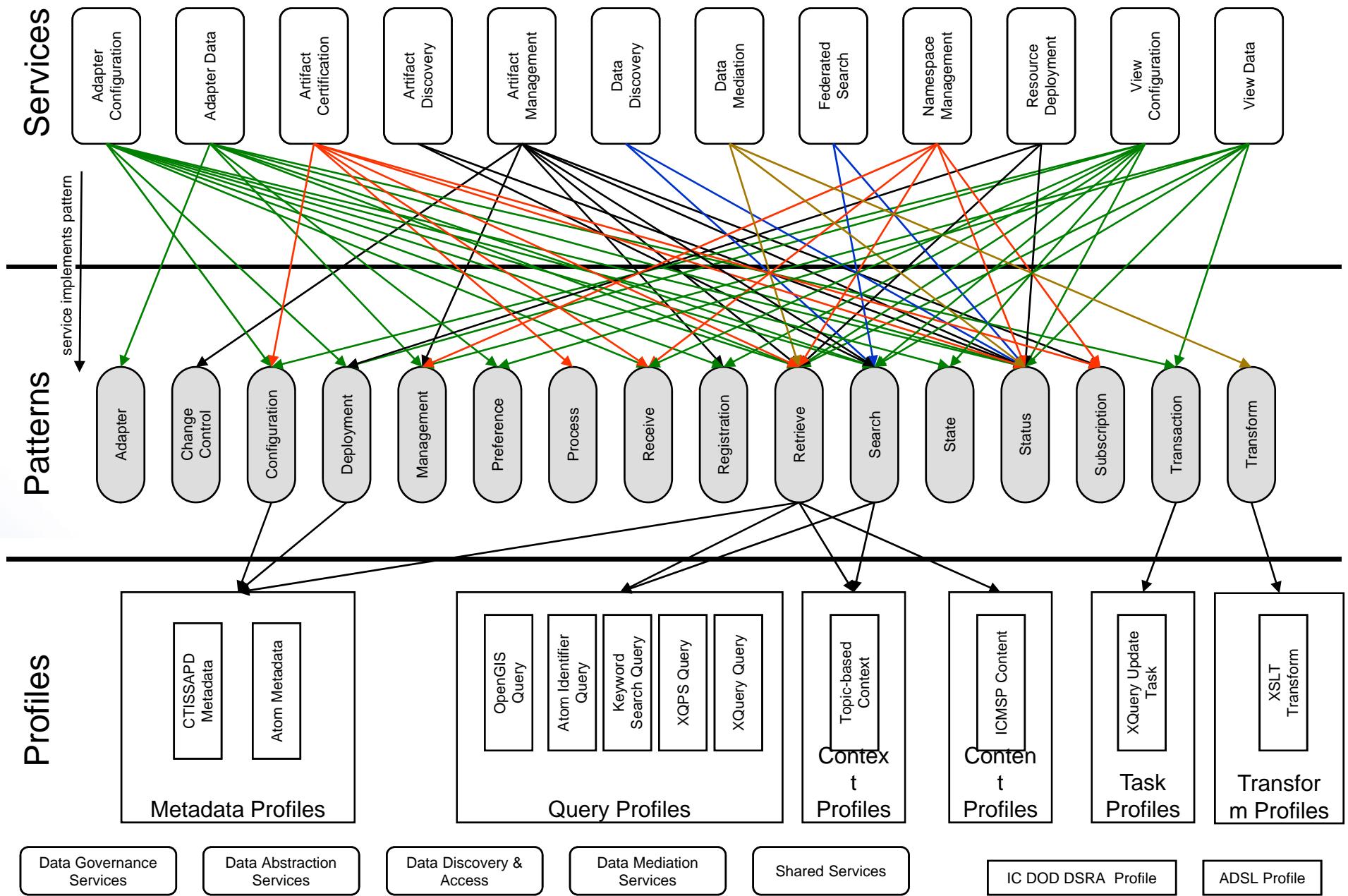
- A profile is a standardized format to represent input request data (realized as an XML fragment in a SOAP message).
- Individual profile types are grouped into profile domains (i.e., categories).
- Use of profiles keeps the ADSL WSDL contracts agnostic to implementation-specific details.



Service Specification Structure: Profiles

- Different profiles from the same domain can be “plugged into” a service request (or a service response) without affecting the high-level behavior of the service operation.
- A particular service implementation may support some profiles but not others.
- New profiles can be added as new technologies and requirements are encountered without affecting existing operations.

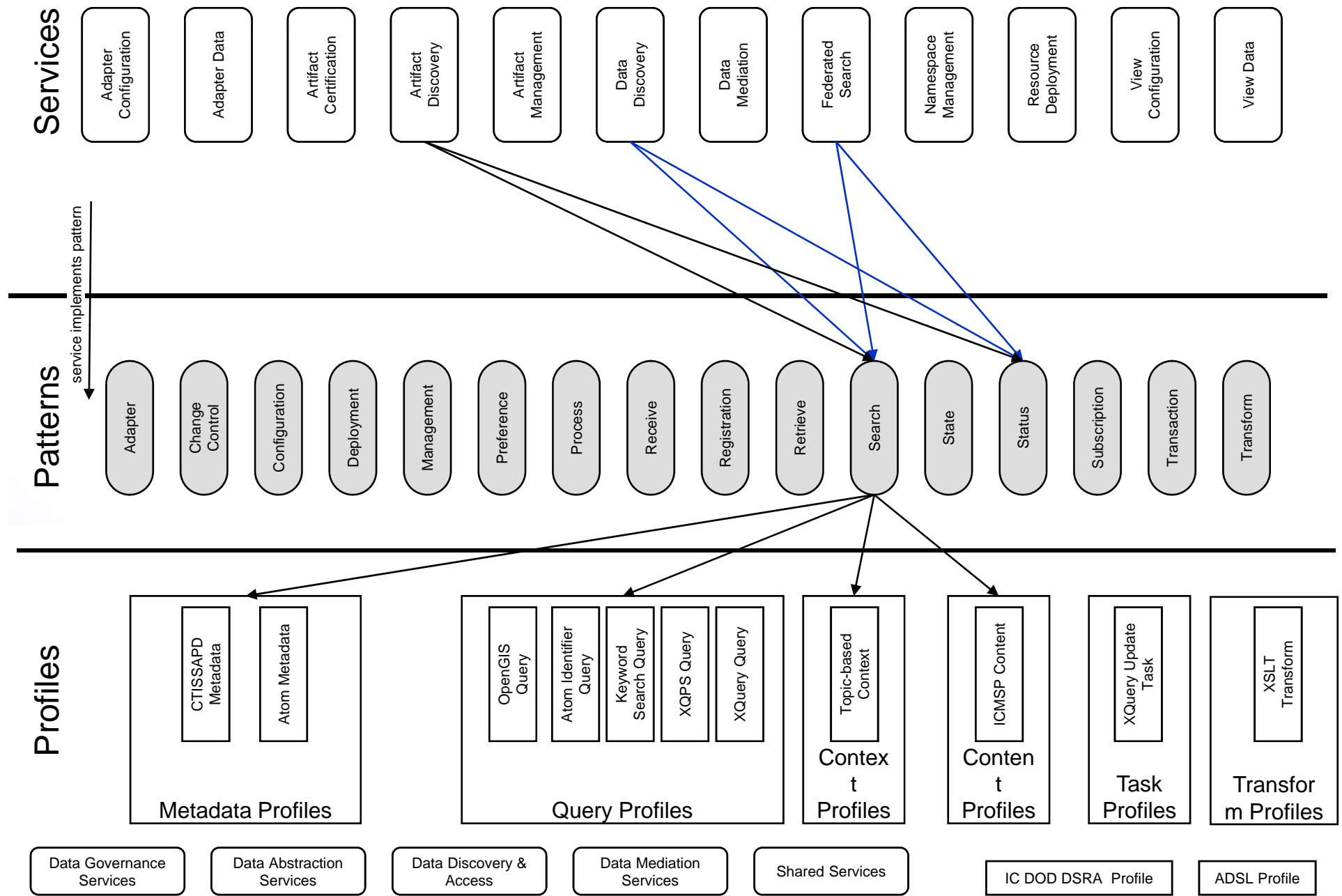
ADSL Specification Architecture



Data Discovery & Access

- The Data Discovery and Access is a family of services that define common interfaces to search and retrieve data across the enterprise.
- Patterns
 - Search
 - Status
 - Receive
- Services
 - Federated Search
 - Artifact Discovery
 - Data Discovery

Data Discovery & Access Dependencies



Data Abstraction

- The Data Abstraction layer is a family of services that accesses and integrates physical data regardless of how the data is structured or where the data resides (e.g., multiple repositories).
 - Services
 - Adapter Data
 - View Data
 - Adapter Configuration
 - View Configuration
 - Resource Deployment
 - Patterns
 - Adapter
 - Configuration
 - Deployment
 - Management (see Data Governance)
 - Preference
 - Receive (see Data Discovery & Access)
 - Registration (see Data Governance)
 - Retrieve
 - Search (see Data Discovery & Access)
 - State
 - Status (see Data Discovery & Access)
 - Transaction

Data Mediation

- Data Mediation is a family of services that enables a consumer to understand data from other web services and to produce a coherent set of information, by making use of certain transformations, or inferences, or simple semantic mappings and validation.
 - Patterns
 - Retrieve (see Data Abstraction)
 - Search (see Data Discovery & Access)
 - Transform
 - Services
 - Data Mediation

Data Management

- Data Management:
 - is a family of services that directly manage data within an organization or business, treating it as a valuable enterprise resource.
 - is designed to ensure and maintain the quality of the data through the use of the available technology and resources over the lifetime of the data.
 - encompasses architectures, policies, practices and procedures that enables sound data management through full data lifecycle needs of an enterprise.
- Data Management provides services for control of local data sources, such as archive, ingest, backup, replication, auditing, reference data management.
- ADSL Specifications still need to be defined for this family of services.

Data Governance

- Data Governance is a family of services that captures and enables policies and practices that affect the overall management of the availability, usability, integrity, and security of the data employed in an enterprise. This service family is implemented by the Army Schema Repository.
 - Services
 - Artifact Management
 - Artifact Certification
 - Namespace Management
 - Patterns
 - Change Control
 - Configuration (see Data Abstraction)
 - Management
 - Process
 - Receive (see Data Discovery & Access)
 - Registration
 - Retrieve (see Data Abstraction)
 - Search (see Data Discovery & Access)
 - Status (see Data Discovery & Access)
 - Subscription

Purpose of Army Schema Repository

- The Army Schema Repository will facilitate governance and allow organizations to enable, automate, and enforce ANCDS policies and processes by:
 - Providing **visibility** and **accessibility** through a shared data space for development and governance of XML data products and associated documentation
 - Ensuring XML data products are **understandable** and **trusted** by validating against standards, policies, compliance criteria and best practices
 - Supporting reuse of XML data products by providing search, view, and retrieval data service capabilities for existing and approved XML data products.
 - **Institutionalizing** and facilitating the Mission Area, Domain, COI processes through automation of life cycle and configuration management for the XML data products.

Promotes reuse, automation and collaboration thus reducing time and cost.

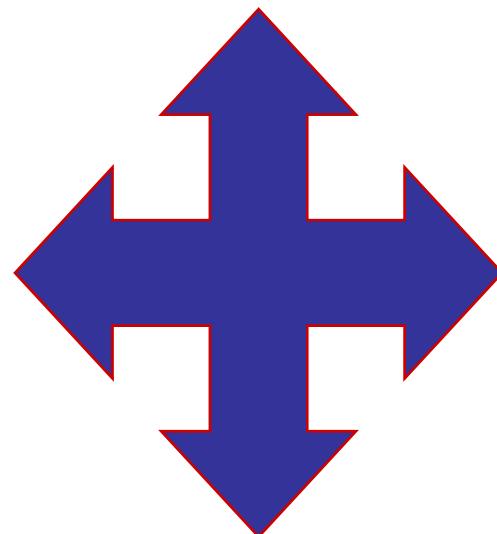
Army Data Services Value Proposition

Army Enterprise:

- ✓ Better, more timely information to support strategic decision making
- ✓ Governance/Standards
- ✓ Reduce Total Cost of Ownership
- ✓ Supports DoD Net Centric Goals

Producers:

- ✓ enables exposure and access to data faster and more efficiently
- ✓ greater ROI due to familiarity and reuse
- ✓ enables support for unanticipated consumers cost-effectively



Consumers:

- ✓ enables faster access and use of required data
- ✓ greater ROI due to familiarity and reuse
- ✓ allows faster aggregation using common specifications
- ✓ enables discovery, access and use of new data to meet unanticipated needs

End Users:

- ✓ More relevant information
- ✓ More timely information
- ✓ Better decision making

Summary

- The ADSL capabilities allow for the implementation of the Army Net-Centric Data Strategy.
- The ADSL Reference Architecture provides the background, model and approach to architecting and implementing a SOA based data services layer to Program Managers and their technical teams.
- The ADSL Service Interface Specifications can be used by service providers and consumers to standardize implementation and use of data services.
- Future iterations of the ADSL Service Interface Specifications will need to be developed based on key learnings, input from other organizations, and ongoing pilots.

Backup

ADSL Origins and Dependencies

ADSL Service Interface Specifications depend on the following organizations and standards:

- **NCES** – Department of Defense (DoD) Net-Centric Enterprise Services (NCES) has established Web service security and other standards and solutions across DoD domain.
- **ANCDS** - the Army Net-Centric Data Strategy (ANCDS) Center of Excellence (CoE) facilitates the execution of the Army's Net Centric Data Strategy and provide users with common and overarching data products and services to promote interoperability and faster access, retrieval, analysis and utilization of data.
- **AE SOAF** – The Army Enterprise SOA Foundation Army (AE SOAF) has defined a set of infrastructure services within the Army enterprise that is compliant and interoperable with NCES standards. These infrastructure capabilities include Service Discovery, Security, Messaging, and Governance. AE SOAF also provides the necessary infrastructure for the ADSL use cases.
- **APCs** - Area Processing Centers (APCs) are the Army's current solution to fulfill the data center requirements for the Army enterprise worldwide.
- **W3C** - The World Wide Web Consortium develops interoperable technologies (specifications, guidelines, software, and tools) to lead the Web to its full potential. The specifications used by ADSL include XQuery, XPath, XSLT, XML Schema, WSDL, SOAP, etc.

Service Interface Specifications Package

- The service interface specifications package consists of the following documentation:
 - Overview
 - 12 Service WSDLs
 - 16 Patterns WSDLs
 - 2 Profiles*
 - 21 Schemas
 - References
 - Glossary

*The ADSL specifications reuse the Intelligence Community Department of Defense (IC DoD) profiles

ADSL Origins and Dependencies

ADSL depends on the following organizations and standards:

- **NCES** – Department of Defense (DoD) Net-Centric Enterprise Services (NCES) has established Web service security and other standards and solutions across DoD domain.
- **ANCDS** - the Army Net-Centric Data Strategy (ANCDS) Center of Excellence (CoE) facilitates the execution of the Army's Net Centric Data Strategy and provide users with common and overarching data products and services to promote interoperability and faster access, retrieval, analysis and utilization of data.
- **AE SOAF** – The Army Enterprise SOA Foundation Army (AE SOAF) has defined a set of infrastructure services within the Army enterprise that is compliant and interoperable with NCES standards. These infrastructure capabilities include Service Discovery, Security, Messaging, and Governance. AE SOAF also provides the necessary infrastructure for the ADSL use cases.
- **NSC/APC** - ADSL will be instantiated at the APCs together with AE SOAF and will utilize NSC capabilities.
- **W3C** - The World Wide Web Consortium develops interoperable technologies (specifications, guidelines, software, and tools) to lead the Web to its full potential. The specifications used by ADSL include XQuery, XPath, XSLT, XML Schema, WSDL, SOAP, etc.

ADSL Service Families

- **Data Discovery and Access** includes services that define interfaces to search and retrieve data across the enterprise. These services can support federated queries, aggregation of search results, and event-driven paradigms such as publish/subscribe.
- **Data Mediation** enables a consumer to understand data from other web services and to produce a coherent set of information, by making use of certain transformations, inferences, or semantic mappings and validation.
- **Data Abstraction** includes services that access and integrate physical data regardless of how the data is structured or where the data resides (e.g., multiple repositories). Data Abstraction promotes the decoupling of information from data, the ability to create virtually structured data, and the creation of a central point to manage changes in data.
- **Data Governance** captures and governs data resources to institutionalize them. The Schema Repository implements some of these services.
- **Data Management** provides the persistence and stewardship of data resources.

Proposed Army Schema Repository

Governance Process

